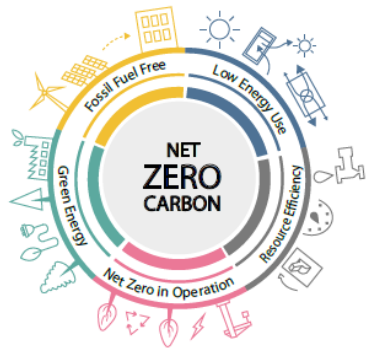
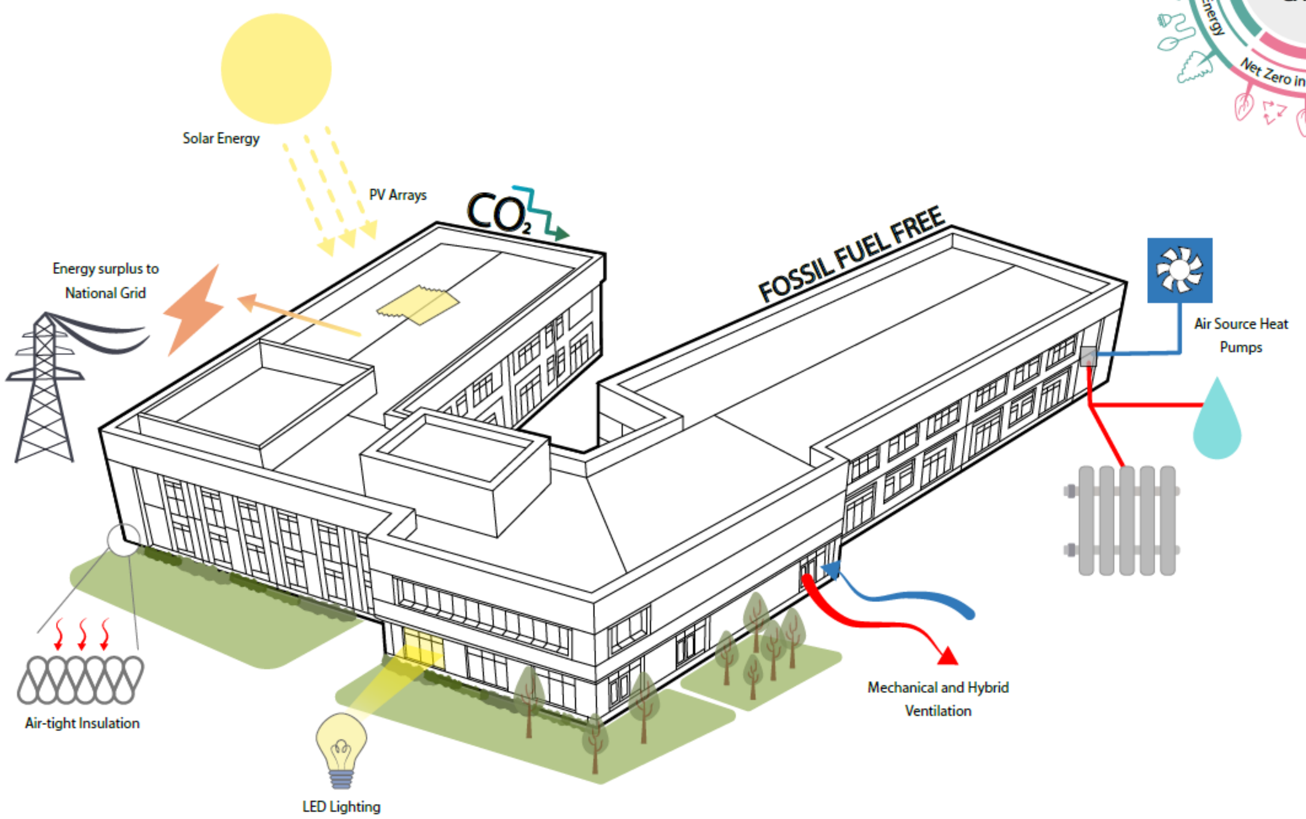
New Special School Cheltenham
Sustainability Statement
NSSC-SC-XX-XX-T-M-000100

For

Kier Construction

October 2025 v4





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AMENDMENT RECORD

Version	Date	Description	Author	Reviewed
V1	02/10/2025	Report Issue	RG	RB
V2	23/10/2025	Report Update	RG	RB
V3	28/10/2025	Report Update	RG	RB
V4	29/10/2025	Final Issue	RG	RB

1.0 INTRODUCTION & TARGETTING

The New Special School Cheltenham is an ‘all-through’ 200 place special school, for children ages 4-16 with Complex Learning Difficulties (CLD). The proposed school will be on the former St Benedict Catholic School site, off Arle Road in Cheltenham. The school is currently in the design phase, to be opened in the 2027/2028 academic year.

The new building will be subject to the Part L2 (2021) of the Building Regulations, so by default will require high levels of energy efficiency in all aspects to achieve compliance. However, this will be exceeded by the Gloucestershire County Council’s declaration of a climate emergency and target for all new buildings to be ‘net zero carbon in operation’.

The building will strive to achieve net zero carbon in operation, relating to both regulated and unregulated emissions. Regulated energy consists of that required for the building operation – heating, hot water generation, lighting etc, and is assessed under the BRUKL calculations in Part L of the Building Regulations. Unregulated energy relates to the power consumption of the building operation, including small usage (i.e. PCs and appliances), as well as catering appliances in the commercial kitchen, assessed through the CIBSE TM54 methodology.

The design principles of ‘net zero in operation’ follow the Department for Education (DfE) design brief and associated Technical Annexes. Whilst the project is not directly funded by the DfE, the annexes will be used as the basis for the design solutions, and as a proven means of targeting high energy efficient design, with residual emissions offset by on-site electricity generation from photovoltaic panels.

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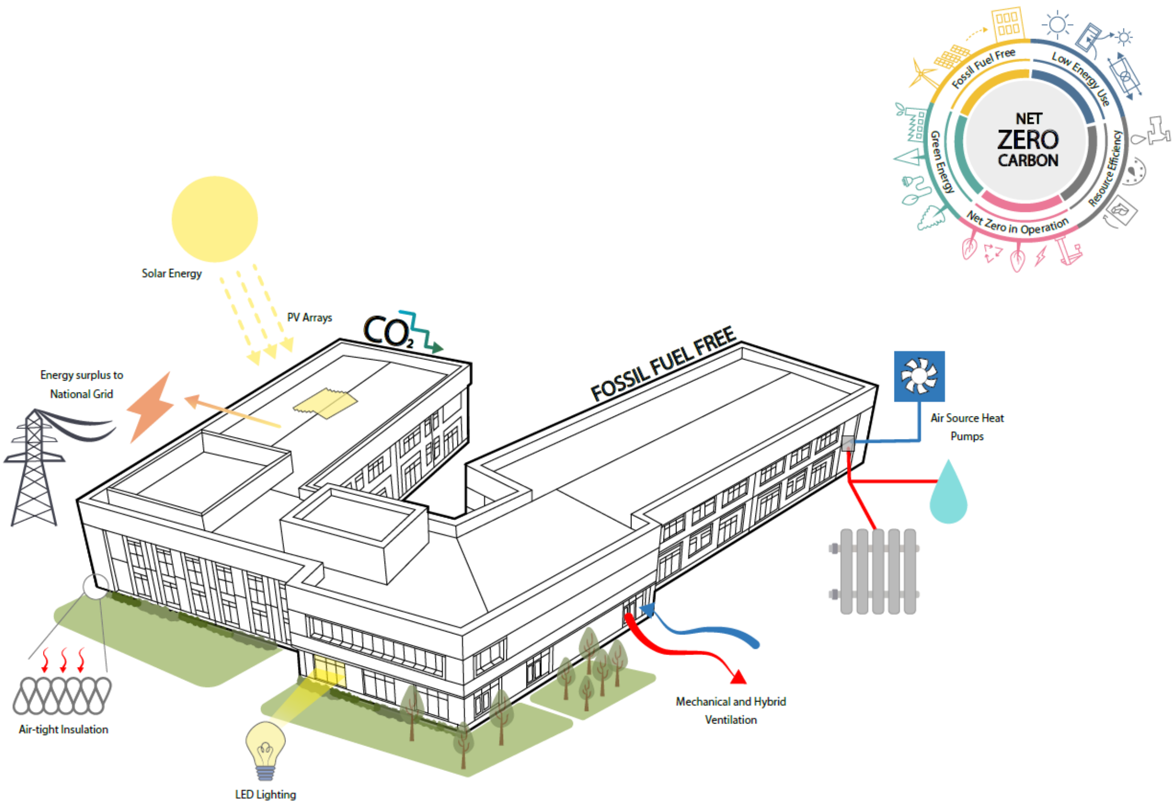
The building operational energy assessment will be made using the CIBSE TM54 assessment – Evaluating Operational Energy Use at the Design Stage. This will be an ongoing process throughout the design stage, including engagement with the end users where feasible to understand the building usage.

The embodied carbon in construction will be considered from an early stage to limit the impact of the construction stage on the environment. Consideration will be given to alternative materials and low carbon construction methods, however this metric will not by directly assessed and quantified.



SOURCE: Roberts Limbrick Architects

2.0 SUSTAINABLE DESIGN PRINCIPLES

2.1 REDUCING BUILDING ENERGY DEMAND

The building form factor and orientation has been optimised to provide good integration with the local landscape and topography, but also enhance the internal environment with good levels of natural light whilst using passive measures to limit solar gains through south facing elements. Consideration of form-factor has simplified building form, helping to reduce heat losses and cold bridges to further reduce the base heat demand of the building.

A 'fabric first' approach will use high levels of insulation and modern construction techniques to minimise heat demand. This will significantly reduce the required heat demand of the building, and required energy for space heating throughout the winter. U-values shall exceed the limiting values identified in Part L with initial targeted figures proposed in the following table, which are subject to design development and will be ratified in the technical design phase of the project.

Proposed Building Fabric & Improvements

	Part L2 2021 U-Values (W/m^2K)	Proposed U-Values (W/m^2K)	Improvement over Part L (%age)
External Walls	0.26	0.15	42%
Ground/Exposed Floor	0.18	0.12	33%
Roof	0.16	0.12	25%
External Glazing	1.6	1.4	12.5%
Rooflights	2.2	1.6	27%
Personnel Doors	1.6	1.1	31%
Air Tightness	8m3/hr.m2	3m3/hr.m2	63%

Through the fabric first approach, the building thermal energy demand can be greatly reduced, with the peak heating demand targeted to be reduced by over 30% compared to building regulations limiting values.

Further passive design measures include high levels of natural daylighting, which will in turn reduce the energy consumption of the artificial lighting, through daylight integrated controls. Passive solar shading in the form of brises soleil will be considered to reduce summertime heat gains as far as practically possible to mitigate overheating and avoid direct air conditioning. Solar control glazing and free night-cooling will be used alongside natural and hybrid ventilation to further control the internal environment without the reliance on air conditioning.

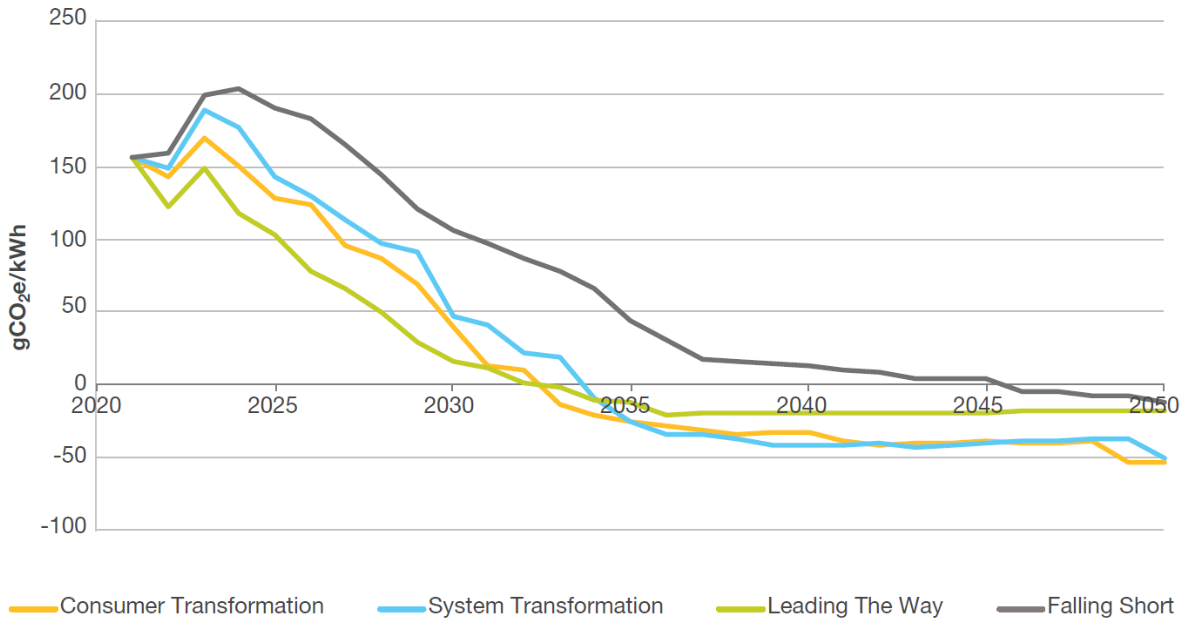
2.2 BUILDING SERVICES EFFICIENCY

Following passive design enhancements to the building fabric and form, the mechanical and electrical building services will be designed to minimise energy consumption, and generate heating and hot water in the most efficient way possible. Air source heat pumps will be used as the primary heat source, coupled with low temperature heat distribution to maximise efficiency. It is proposed that a cascade of heat pumps are used to meet the total space heating demand, which will improve modulation and efficiency, as well as reducing external compound requirements and access.

LED lighting with automatic controls and daylight dimming will be used throughout, and capitalise on the high levels of natural light in the building. Low flow sanitary fittings will be used throughout to minimise water consumption, and the level of energy consumption associated with hot water generation. Rainwater harvesting will also be employed for toilet flushing as part of the Sustainable Drainage Systems (SuDS) strategy to reduce water consumption and discharge of rainwater from the site.

By using electricity as the sole fuel for space heating and hot water, the direct demand of the building on fossil fuels is minimised. As the national grid continues to decarbonise, the CO_2 emissions associated with all aspects of the building's energy consumption will be reduced. This principle extends to the catering kitchen, where all appliances are electrically powered, which in turn reduces ventilation requirements and the associated energy consumption of air handling units.

The decarbonisation of the national grid is highlighted in the following graph, with project grid carbon factors reaching Net Zero by 2045 even in the worst-case scenario.



SOURCE: National Grid Future Energy Scenarios

Image 2.2.1 Sample Air Source Heat Pump Unit

Building energy demand will be calculated and assessed using the BRUKL method under Part L2 of the building regulations, as well as via the TM54 operational energy assessment. As the site will be fossil-fuel free, the only energy consumption will be electricity, which will allow complete decarbonisation of the site following the grid decarbonisation shown in the previous graph.

Provisional estimates are made to calculate the total building energy consumption and carbon dioxide emissions, which will subsequently calculated and assessed through the detailed design stage. The intial estimates are as follows:

- Total Annual Electrical Energy Use: 146,000 kWh

- Total Annual CO_2 Emissions: 30,200 kg.CO2

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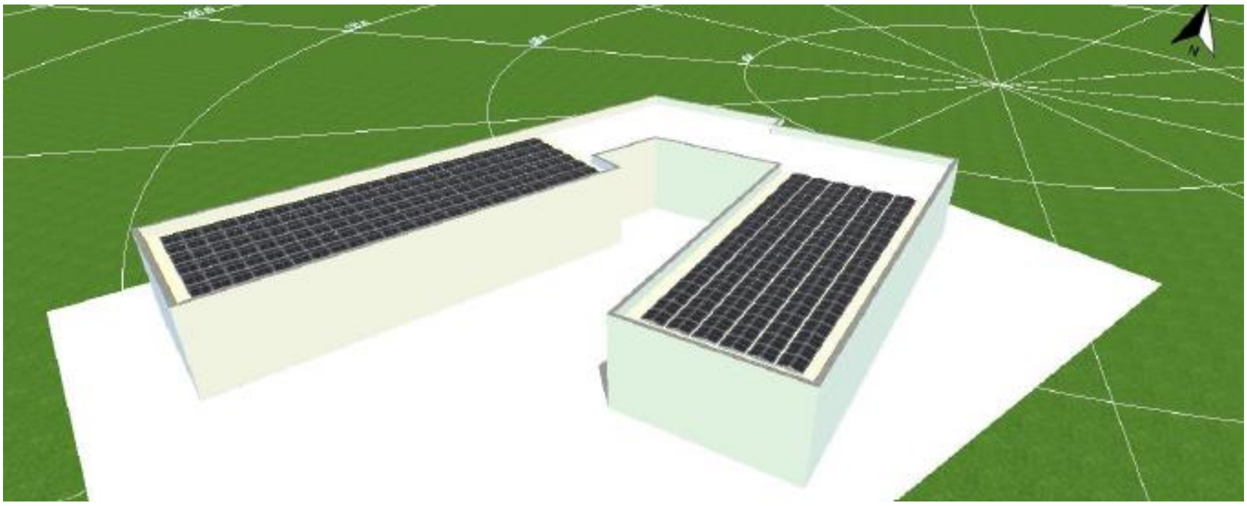
2.3 ON-SITE GENERATION

Following the efforts to minimise the building energy demand, then secondly to ensure all building services systems meet the demand in the most efficient manner possible, focus is then turned to on-site electrical energy generation.

On-site electricity generation will contribute directly to the energy demand of the air source heat pumps for space heating and hot water generation, and in cases of high PV yield will satisfy the heat pump electrical load leading to a complete carbon neutral heating and hot water installation. At times of low energy demand and high yield, the electricity generated from the PV array will be exported to the national grid to offset consumption during peak demand.

The amount of electrical energy generated, and hence CO_2 emissions offset through the installation of the PV arrays is targeted to achieve 100% offset of the building CO2 emissions as detailed in the previous section.

Initial proposals from PV specialists have been provided, utilising the necessary roof area to achieve the required yield. This is detailed in the graphic below, however is subject to final detailed design and building thermal modelling.



The initial PV design and modelling has identified a total feasible area of the PV array of 1,079m2 with a total peak generation of 243kWp. The expected annual yield from this is 230,000kWh per annum, offsetting close to 45,000 kg.CO2 per annum.

Even allowing for efficiency loss due to roof penetrations which may reduce the total achieved array, there is capacity to achieve the targeted 100% offset of operational CO_2 emissions.

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3.0 KEY SUSTAINABILITY FEATURES SUMMARY

- The site will be designed to minimise operational energy demand of the school and associated CO2 emissions.
- A fabric-first approach will use high levels of insulation and air-tightness to minimise heat demand, significantly exceeding building regulations.
- It will be a fossil-fuel free site. With no gas supply or boilers.
- Heating and hot water will be generated by air-source heat pumps.
- Mechanical and hybrid ventilation will incorporate heat recovery in all cases to maintain comfort conditions with minimal energy impact.
- Daylighting analysis will make best use of natural light, and avoid reliance on artificial lighting.
- Artificial light will be LED, with automatic controls comprising occupancy sensors and daylight dimming.
- Electricity will be generated on-site by substantial roof-mount PV arrays (solar panels).
- The design will target ‘net zero carbon in operation’, by offsetting the whole site energy demand via the electricity generated by the PV arrays.
- At times of low site demand (i.e. summer holidays), electricity will be exported to the national grid providing a low-carbon energy source to other buildings in the locality.

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